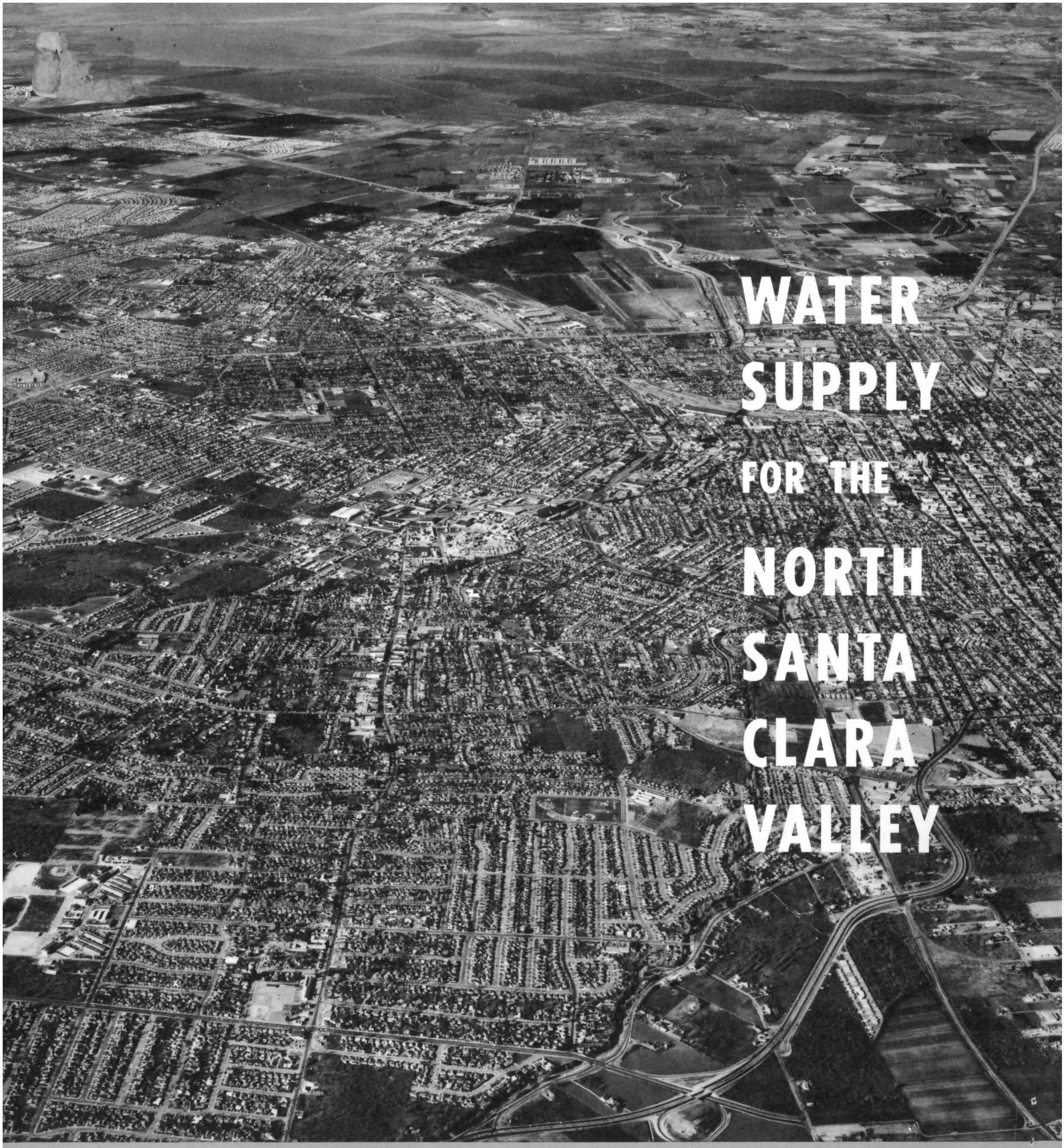


WATER SUPPLY FOR THE NORTH SANTA CLARA VALLEY

ing report and summary of engineering, economic, and other factors affecting water supply in
h Santa Clara Valley and construction of the In-County Distribution System for imported water

ZONE W-1

SANTA CLARA COUNTY FLOOD CONTROL AND
WATER CONSERVATION DISTRICT

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ZONE W-1
SANTA CLARA COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

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SEPTEMBER 1962

STONE & YOUNGBERG
Municipal Financing Consultants
SAN FRANCISCO LOS ANGELES

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COVER PHOTO—Looking northwest over San Jose and the North Santa Clara Valley with Milpitas in the upper right and Sunnyvale in the upper left.

CLYDE SUNDERLAND PHOTO

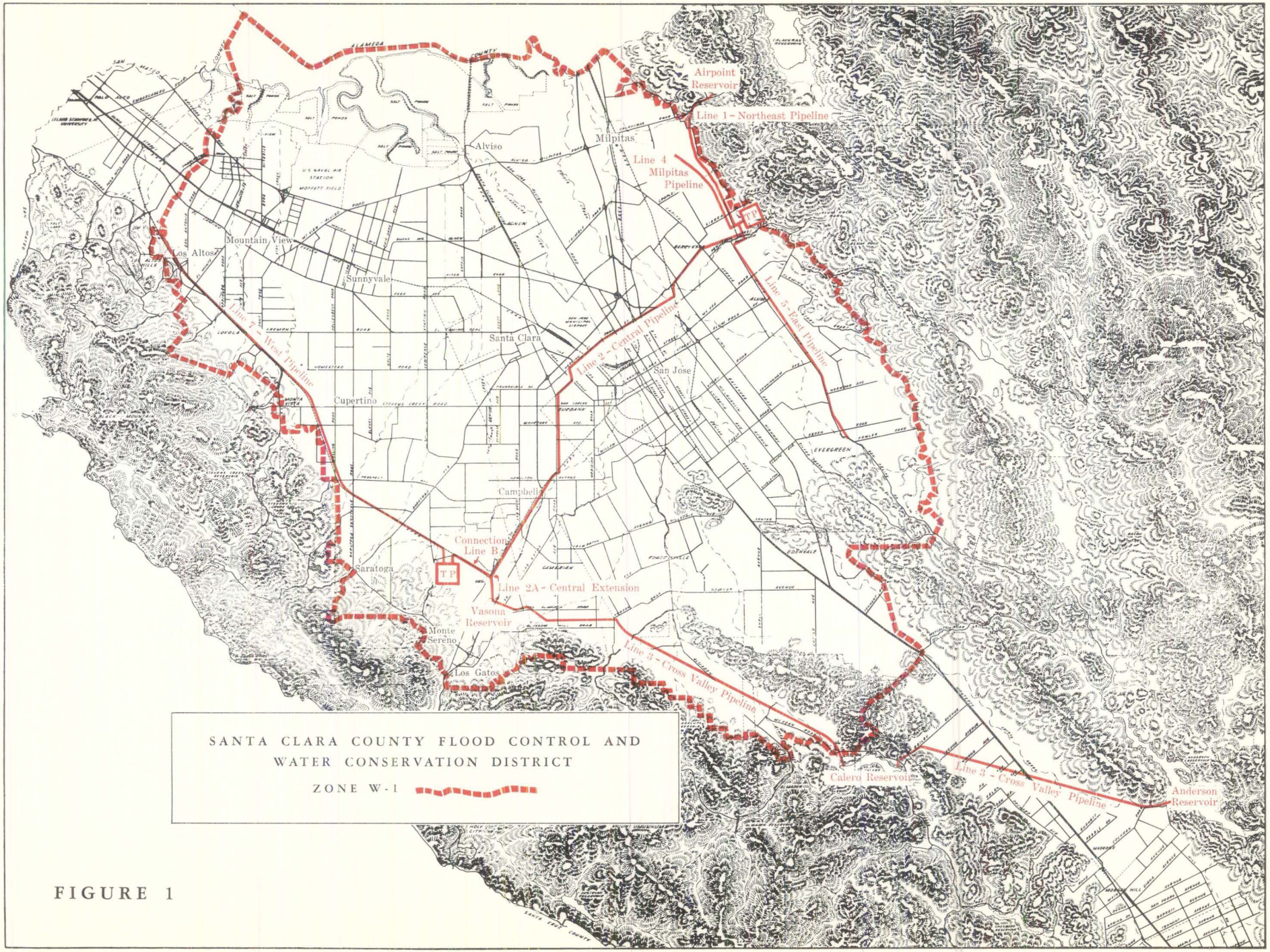

Airpoint Reservoir
Line 1 - Northeast Pipeline
Milpitas
Alviso
Line 4 Milpitas Pipeline
T P
Mountain View
Los Altos
Sunnyvale
Line 5 - East Pipeline
Line 7 - West Pipeline
Line 2 - Central Pipeline
Santa Clara
San Jose
Cupertino
Campbell
Connection Line B
T P
Saratoga
Line 2A - Central Extension
Vasona Reservoir
Monte Sereno
Los Gatos
Line 3 - Cross Valley Pipeline
Calero Reservoir
Line 3 - Cross Valley Pipeline
Anderson Reservoir
SANTA CLARA COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
ZONE W-1

FIGURE 1

INTRODUCTION AND SYNOPSIS

This summary report presents the pertinent facts on the proposed in-county distribution facilities for imported water in Santa Clara County. It summarizes the significant findings, conclusions, and recommendations of the engineering and financing consultants of the Santa Clara County Flood Control and Water Conservation District, the Santa Clara County Water Commission, and the reports of consultants to other water agencies in the county.

The proposed "in-county" facilities will be constructed by "Zone W-1" of the Santa Clara Flood Control and Water Conservation District, which is called the "North Santa Clara Valley" in this report and which includes twelve incorporated cities: Alviso, Campbell, Cupertino, Los Altos, Los Gatos, Milpitas, Monte Sereno, Mountain View, San Jose, Santa Clara, Saratoga, and Sunnyvale. The major portions of the cities of Palo Alto and Los Altos Hills are not in Zone W-1.

The consultants' reports and the report of the Water Commission contain the following conclusions as to the basic need for additional water supply in the North Santa Clara Valley:

- The growth of the North Santa Clara Valley since the 1940's has resulted in extensive overdraft of underground water supplies—causing water shortages, higher pumping costs, land subsidence, damage to underground utilities and other economic losses.
- The further growth and development of the North Santa Clara Valley is dependent upon the availability of an adequate water supply.
- Santa Clara County has entered into an agreement with the State of California for construction of the South Bay Aqueduct and the delivery of 88,000 acre-feet of water per year to the county at Airpoint Reservoir near Milpitas. It is now up to the county to provide the in-county facilities necessary for utilization of this water.
- Based on extensive engineering and economic studies a water importation and distribution plan has been developed which will take water from the state's South Bay Aqueduct at Airpoint Reservoir across the valley to Los Gatos for percolation. Branches of the system extend to Mountain View-Palo Alto, to Anderson Dam (terminus of the Pacheco Pass Aqueduct), and to the Evergreen area. Treatment plant facilities will be included and will be built as needed to supply the demand for surface-delivered treated water.
- Construction of the basic in-county facilities will require a revenue-supported general obligation bond issue of $42,050,000. The initial distribution facilities will deliver water for percolation in the summer of 1964. Most of the distribution system will be completed within a five-year period.
- The capital costs, including interest, of the South Bay Aqueduct to Airpoint Reservoir and the Pacheco Pass Aqueduct to Anderson Dam will be paid by a 5 cent county-wide ad valorem tax on land and improvements. All other costs and expenses are to be paid by agricultural and municipal and industrial groundwater charges (pump tax) and from the sale of treated water.
- The water facilities will bring important benefits to the north county area, including: replenishment of the overdraft, conservation of underground supply, alternate sources of supply, reduction of subsidence, protection of underground reservoir capacity, maintenance of water quality, prevention of saline intrusion, reduction of pumping costs, stabilization of water levels, controls over pricing of imported supplies, and recreation.
- The in-county facilities are multipurpose in that (a) they will allow for use of South Bay Aqueduct water for percolation and for surface delivered treated water, (b) they will be used for transportation of Pacheco Pass water into the Los Gatos area for percolation and replenishment of the basin, and (c) they will provide for moving waters from natural storage in Anderson and Calero Reservoirs into percolating areas. The proposed facilities are flexible and can take advantage of the availability of water to permit its most economical use.
- The engineering consultants state that the construction and operation of the facilities is completely feasible, and can be accomplished within the estimated cost. The financial consultants conclude that the system described in the engineering report is financially feasible and that the general obligation bonds can be supported from revenues.

BASIS FOR THE SUMMARY REPORT

The Santa Clara County Flood Control and Water Conservation District was formed in 1951 and includes the entire County of Santa Clara. The district is an independent public agency governed by the County Board of Supervisors with its own manager-counsel and staff. The district uses the principal officers of the county for special services.

In addition to flood control works, the district has taken all necessary steps to implement the importation of water through the facilities of the South Bay Aqueduct. These include the creation of the Santa Clara County Water Commission, the signing of a contract with the State of California for the delivery of South Bay Aqueduct water, and the development with the Water Commission of extensive engineering and financing studies of the proposed in-county distribution and treatment facilities.

In March 1961 the Board of Supervisors created the Santa Clara County Water Commission to act as an advisory board in water matters. The Water Commission, composed of representatives of all of the cities and the major water agencies in the county, has provided a continuing board of review on the water problems of northern Santa Clara County.

The Water Commission established a pricing and financing sub-committee which has served as the principal study group in evaluating water importation alternatives and providing information for the Water Commission. The pricing and financing subcommittee was assisted in this work by the manager-counsel of the Santa Clara County Flood Control and Water Conservation District and its staff and consultants.

The purpose of the Water Commission was to consolidate information obtainable from these sources and to draw up a plan of action and a program which could be approved by the voters of the area benefited by the project. Its efforts have resulted in the creation of the proposed plan for construction of the in-county facilities.

Based on the recommendation of the Water Comission, Zone W-1 of the Flood Control and Water Conservation District was formed by the Board of Supervisors as the basic unit for financing and construction of the in-county water importation facilities.

Zone W-1 includes all or major portions of the incorporated cities of Alviso, Campbell, Cupertino, Los Altos, Los Gatos, Milpitas, Monte Sereno, Mountain View, San Jose, Santa Clara, Saratoga, and Sunnyvale. The zone also includes all of the northern Santa Clara Valley basin from Coyote north to San Francisco Bay and from Milpitas on the east to Mountain View and Los Altos on the west. The major portions of the cities of Palo Alto and Los Altos Hills, and all of the county south of Coyote and the mountainous areas of the county to the east and west are excluded from the zone.

An engineer's report on the proposed project has been presented to and approved by the Board of Supervisors. November 6 has been set as the date for a bond election. Passage of the bond issue will require a two-thirds majority of those voting within Zone W-1.

This summary report presents a compilation of the facts from the studies made by consultants for the many agencies interested in water supply for northern Santa Clara County, from information developed by the Water Commission through its pricing and financing subcommittee and the Flood Control and Water Conservation District and its staff, and from other reports prepared on the project. Its purpose is to aid members of the Water Commission, officers of their respective

cities and agencies, and the Board of Supervisors and others to get a better understanding of the water problem and the proposed plan of construction and financing.

The program for water importation recommended by the Water Commission has been the result of close cooperation among the Water Commission, the Flood Control and Water Conservation District, and two other major water agencies in Santa Clara County, namely, the Santa Clara Valley Water Conservation District and the Santa Clara-Alameda-San Benito Water Authority. The Flood Control and Water Conservation District and the Water Commission have also maintained liaison with the cities, counties, and other public agencies of interest in the proposed projects.

The consulting-engineering firm of Creegan & D'Angelo, San Jose, participated as consultants to the Santa Clara-Alameda-San Benito Water Authority and the Santa Clara Valley Water Conservation District and prepared plans of proposed in-county transmission lines for the Flood Control and Water Conservation District engineer's report. Kennedy Engineers, of San Francisco, prepared analyses of water quality and a detailed study and engineering report on water treatment facilities as a part of the water importation program.

The firm of Stone & Youngberg, San Francisco, financing consultant to the Flood Control and Water Conservation District, advised the pricing and financing subcommittee and has prepared this summary report.

The in-county construction program has been approved as to legality by Donald K. Currlin, manager-counsel of the Flood Control and Water Conservation District and by Orrick, Dahlquist, Herrington & Sutcliffe, the district's special bond counsel.

Two major engineering reports on the project have been submitted to the Flood Control District and the Board of Supervisors. These are: "Water Treatment for South Bay Aqueduct Supply to Santa Clara County," Kennedy Engineers, and "Proposed Water Treatment & Distribution System," Flood Control District Engineer and Creegan & D'Angelo.

The pertinent provisions of the consultants' reports on the in-county facilities and their relationship to the South Bay Aqueduct and the Pacheco Pass Aqueduct are discussed in greater detail in subsequent sections of this summary report.

A supply of imported water for Santa Clara County was assured in November of 1961 when the County Board of Supervisors signed a contract with the State of California for the annual delivery of up to 88,000 acre-feet of water per year at Airpoint Reservoir near Milpitas, beginning in 1964.

It is now up to the area within the North Santa Clara Valley to provide distribution facilities for water delivered by the South Bay Aqueduct, and by the Pacheco Pass Aqueduct when it is completed in about 1970. The recommended plan contemplates a major network of pipelines extending from Airpoint Reservoir near Milpitas to Penitencia Creek for percolation, thence through San Jose to Los Gatos, where water can be delivered for percolation in Los Gatos Creek. A branch line will go from Los Gatos north to Los Altos and Mountain View, with capacity for Palo Alto. A second line will run from Anderson Reservoir to Calero Reservoir and thence to Los Gatos Creek to bring Pacheco Pass Aqueduct water or natural runoff to that area for percolation. Another branch line, for treated water, will extend south from Milpitas to the Evergreen area.

The financing plan consists of three basic parts with different elements of the system to be financed in different ways and paid for from different sources. Repayment to the State of California for the county's share of the capital costs of the South Bay Aqueduct, with interest, and portions of the Pacheco Pass Aqueduct are to be financed by a 5 cent county-wide ad valorem tax on land and improvements. The in-county costs of water—including the in-county pipelines, purchase of water, operation and maintenance costs of all pipelines including the South Bay Aqueduct, and other costs associated with the transportation of water in the county—are to be financed by a groundwater charge (pump tax) of $5 per acre-foot for agricultural water and $10 per acre-foot for municipal water. The cost for treatment of surface delivered water in excess of the cost of the

transportation charge is to be paid for directly by the consumers of such treated water. It is estimated that the total cost for treated water, including transportation charge, will be approximately $40 per acre-foot.

The total estimated cost of the proposed facilities is $42,050,000 and is to be financed by the issuance of revenue-supported general obligation bonds within the area encompassed by Zone W-1. These bonds are to be repaid from revenues from groundwater charges and from sales of treated water. While the bonds are secured by the power of taxation, their repayment will come entirely from revenues of the system without recourse to the taxing power of the Flood Control and Water Conservation District.

This report contains background material and a summary of the financing analysis leading to the conclusion that the in-county facilities can be supported entirely from revenues. Tables 5, 6, and 8 present projections of water needs, assessed valuations, and construction costs, respectively. Tables 10, 11, and 12 present analyses of bond financing costs, sources of revenue, and a summary of total revenues and expenses for the raw water importation program, respectively.

The general obligation bond issue for Zone W-1 is the key to the financing program since further engineering studies, development of plans and specifications, and the start of construction cannot be undertaken until after the bonds are voted for construction of the basic system.

THE NEED FOR IMPORTED WATER SUPPLY

It is a well-documented fact that existing sources of water supply, both from groundwater and from local surface supplies, in addition to the water imported by the Hetch Hetchy system of the San Francisco Water Department, are not adequate to meet the continuing growth of the North Santa Clara Valley. The following section of this report discusses the danger signals which are the direct result of an inadequate water supply, the growth which creates the need for additional supplies, and projections of water needs.

The Danger Signals

OVERDRAFT AND DEPLETION: Immediate recognition of an inadequate water supply is evidenced by the conditions of overdraft and depletion of the groundwater basin. Tangible, visible evidence is given in the form of lowered and receding groundwater levels. The resultant damage can be measured in terms of increased pumping costs, costs of lowering pumps and deepening wells, increasing scarcity of water supplies, and water rationing.

The effects of overdraft and resulting depletion can be seen in the North Santa Clara Valley basin from Los Altos on the north, Milpitas and Evergreen on the east, through the basin to Saratoga, Los Gatos, and Almaden on the south. Best estimates indicate that there is presently a total accumulated depletion of the basin of between 500,000 and 700,000 acre-feet. This depletion can be expected to continue in the North Santa Clara Valley at a rate of more than 60,000 acre-feet per year until imported water is delivered.

SUBSIDENCE: Further evidence of the inadequacy of groundwater sources in the basin is given by subsidence or lowering of the ground surface upon removal of underground water. In 1962 a publication by the U. S. Geological Survey provided a direct comparison between artesian (groundwater) pressures and the lowering of ground surfaces in Sunnyvale, Mountain View, and San Jose. The report of the U. S. Geological Survey said, in part:

> "Subsidence of the land surface in the Santa Clara Valley, Santa Clara County, Calif., has been observed since 1933. A network covering the area of subsidence was first surveyed in the spring of 1934. That network was releveled seven times between November 1934 and April 1940, again in 1948 and 1954, and in part in 1956 and 1959, by the U. S. Coast and Geodetic Survey.
>
> "The releveling of the network in 1954 indicated that the land surface had subsided 7.75 feet at . . . San Jose. Subsidence near Sunnyvale from 1934 to 1954 was greater than at San Jose.
>
> "Plots of subsidence at individual bench marks compared to fluctuation in artesian pressure indicate that decline in artesian pressure is a major cause of subsidence . . ."
>
> *(Bulletin 1916C—1962)*

Subsidence results in inestimable damage to underground facilities, particularly sewer and storm drainage facilities, and to surface structures such as streets and gutters, all of which represent investments of many millions of dollars.

SALINE INTRUSION: Further evidence of the inadequacy of existing supplies can be seen in the lowering of quality of the water obtainable from wells. Deterioration of the groundwater supply is occurring through the intrusion of salt water into the basin upon the removal of fresh water supplies.

Salt water intrusion in the coastal areas of Alameda, Los Angeles, and Orange Counties has already been shown to be a threat of major proportions. Northern Santa Clara Valley cities which use wells as supplemental or primary water supplies are facing this threat to water quality. With continued lack of adequate water pressures in underground reservoirs, salt water may penetrate into the basin.

Growth of Area

GROWTH OF CITIES: Twelve of the 16 incorporated cities in Santa Clara County are located within Zone W-1. In 1962 the estimated population of the 12 cities was over 500,000 and represented more than 68 per cent of the total estimated county population. In the same year the land area of the 12 cities totaled 176 square miles, 13 per cent of the total county land area.

Table 1 shows the growth in population and area of the 12 cities from 1950 to 1962. Six of the twelve cities were not incorporated in 1950.

TABLE 1

NORTH SANTA CLARA VALLEY (ZONE W-1)

Population and Area Growth of Cities

City	Population			Land Area (Square Miles)		
	1950	1962	Per Cent Increase①	1950	1962	Per Cent Increase①
Alviso	700	1,600	129%	9.9	13.7	38%
Campbell	6,400①	14,100	120	1.5①	4.1	173
Cupertino	2,100①	5,400	157	3.8①	6.3	66
Los Altos	14,500①	21,600	49	4.5①	5.1	13
Los Gatos	4,900	11,400	133	1.5	14.0	833
Milpitas	1,100①	10,900	891	2.9①	8.6	197
Monte Sereno	1,300①	1,600	23	1.3①	1.6	23
Mountain View	6,600	34,900	429	1.1	9.1	727
San Jose	95,300	255,000	168	17.2	68.9	301
Santa Clara	11,700	72,100	516	4.9	13.3	171
Saratoga	10,000①	16,200	62	13.6①	13.7	1
Sunnyvale	9,800	60,600	518	6.0	17.6	193

① Figures based on first year of incorporation: Campbell, 1952; Los Altos, 1952; Milpitas, 1954; Cupertino, 1955; Saratoga, 1956; Monte Sereno, 1957.

As shown in Table 2 the twelve cities taken as a group have shown an average annual population increase of over 12 per cent during this period and a total increase of almost 300 per cent from the base year (or first year of record). This compares with an average annual increase of about 11 per cent for all incorporated areas and approximately 8 per cent for the entire county. In the same period the land area of the twelve cities increased an average of 13 per cent per year and a total of more than 300 per cent over the base year.

TABLE 2

NORTH SANTA CLARA VALLEY (ZONE W-1)

Population and Area Growth of Cities By Year 1950-1962

Year	Number Cities	Total Population	Annual Increase	Total Area (Sq. Miles)	Annual Increase
1950	6	129,000		40.6	
1951	6	133,500	3.5%	41.1	1.2%
1952	8	162,500	21.7	42.5	3.4
1953	8	175,700	8.1	52.1	22.6
1954	9	194,200	10.5	57.0	9.4
1955	10	217,200	11.8	69.6	22.1
1956	11	251,700	15.9	85.4	22.7
1957	12	280,900	11.6	109.0	27.6
1958	12	316,100	12.5	123.5	13.3
1959	12	363,000	14.8	133.2	7.9
1960	12	415,300	14.4	147.3	10.6
1961	12	465,400	12.1	166.1	12.8
1962	12	505,400	8.6	176.0	6.0
Average Annual Increase			12.1%		13.3%

TABLE 3

SANTA CLARA COUNTY

Thirteen Year Summary of Population and Assessed Valuation

Year	Population①	Annual Increase	Total Assessed Valuation②	Annual Increase
1950	291,000		$ 326,499,595	
1951	307,000	5.5%	349,502,885	7.0%
1952	330,000	7.5	399,091,370	14.2
1953	353,000	7.0	455,290,200	14.1
1954	383,000	8.5	494,335,730	8.6
1955	416,000	8.6	552,184,985	11.7
1956	451,000	8.4	623,921,820	13.0
1957	489,000	8.4	749,190,970	20.1
1958	532,000	8.8	854,691,660	14.1
1959	584,000	9.8	961,120,420	12.5
1960	642,000	9.9	1,084,884,970	12.9
1961	693,000	7.9	1,266,359,970	16.7
1962	737,000	6.3	1,416,867,070	11.9
Average Annual Increase		8.1%		13.1%
Total Increase over Base Year		153.3%		334.0%

① As of April 1.

② For fiscal year ending June 30.

COUNTY GROWTH: According to the 1960 U. S. Census, Santa Clara County population increased 121 per cent in the period 1950-1960, the fastest growing county in the San Francisco Bay Area. The Santa Clara County population increased from 10.8 per cent of the nine-county bay area total in 1950 to 17.7 per cent of the 1960 total.

Table 3 shows the annual growth in county population and total assessed valuation for the period 1950-1962. Annual population growth during the period has averaged a little over 8 per cent, with better than a 150 per cent increase over the base year. Total assessed valuation has increased an average of 13.1 per cent annually and is more than four times greater than in 1950.

PROJECTIONS OF POPULATION AND ASSESSED VALUATION: The following tabulation of projected county population and assessed valuations to fiscal year 1989/90 is based on estimates prepared by the Santa Clara County Planning Department and Flood Control District staffs. The North County planning area includes generally the same area as Zone W-1 plus the cities of Palo Alto and Los Altos Hills.

Population growth projections for the North County area have been based on an approximate 5 to 6 per cent annual increase during the 1960's, tapering off to a little over 2 per cent by 1990. Projections for the entire county show a slightly higher, but similar pattern. A 30-year assessed valuation projection is presented in Table 6.

TABLE 4

SANTA CLARA COUNTY

Future Population of North County Planning Area① and Total County

Year	North County Population	Total County Population	Year	North County Population	Total County Population
1963	750,000	775,000	1975	1,253,000	1,330,000
1964	790,000	820,000	1980	1,420,000	1,540,000
1965	837,000	870,000	1985	1,580,000	1,770,000
1970	1,054,000	1,100,000	1990	1,750,000	1,980,000

① Zone W-1 plus Palo Alto and Los Altos Hills.

Projections of Water Needs

The future water requirements of the North Santa Clara Valley have been the subject of several intensive investigations over many years. These investigations have involved the U. S. Bureau of Reclamation, the State Department of Water Resources, the Santa Clara Valley Water Conservation District, the Santa Clara-Alameda-San Benito Water Authority, and the Santa Clara County Flood Control and Water Conservation District. Table 5 presents a summary of the estimated future water requirements for the 30-year period 1963 through 1992. These estimates, prepared by the Flood Control and Water Conservation District, are based primarily on the research studies of the U. S. Bureau of Reclamation.

Two major uses of water supplies have beenidentified in the table. These are agricultural use, for crop and other agricultural production, and "municipal and industrial" use, by residential, commercial, municipal, and industrial purposes, including distribution by pressure water systems. As shown in Table 5, the total need in the next 30 years will increase from about 262,800 acre-feet in 1963 to 330,900 acre-feet in 1992. Agricultural requirements are expected to decline from 120,200 acre-feet in 1963 to 40,900 acre-feet in 1992.

Municipal and industrial requirements will more than double in the next 30-year period, increasing from 142,600 acre-feet in 1963 to 290,000 acre-feet in 1992. A portion of the municipal

and industrial supply will be obtained from the Hetch Hetchy facilities of the San Francisco Water Department. The Hetch Hetchy contribution is estimated to vary from about 17 per cent in 1963 to approximately 12 per cent of the municipal and industrial water requirement in 1992.

The remaining municipal and industrial water requirements (after adjustment for deliveries from the Hetch Hetchy system and for the surface storage facilities of the San Jose Water Works) will amount to 107,700 acre-feet in 1963 to 243,500 acre-feet in 1992. Until treated surface water supplies are available, this must be provided from the underground, along with the agricultural requirements previously shown.

It is anticipated that by 1966 facilities can be provided which will supply treated water from surface supplies which will help to curtail the overdraft of groundwater supplies. These studies indicate further that, even with normal rainfall, accelerated percolation by the Santa Clara Valley Water Conservation District, and with the advent of imported water from the South Bay Aqueduct,

TABLE 5

NORTH SANTA CLARA VALLEY (ZONE W-1)

Estimated Water Requirements (Acre-Feet)

Fiscal Year	Total Demand All Use①	Agricultural Demand	Municipal and Industrial Demand①	Municipal and Industrial Components				
				Surface Diversions	Hetch Hetchy Deliveries①	Net Amount Required	Treated Water Deliveries	Required from Groundwater
1962/63 ...	262,800	120,200	142,600	11,200	23,700	107,700	.....	107,700
1963/64 ...	266,500	118,900	147,600	11,200	24,100	112,300	.....	112,300
1964/65 ...	270,100	117,400	152,700	11,200	24,500	117,000	.....	117,000
1965/66 ...	273,600	115,900	157,700	11,200	24,900	121,600	10,000	111,600
1966/67 ...	277,100	114,300	162,800	11,200	25,300	126,300	11,000	115,300
1967/68 ...	280,300	112,500	167,800	11,200	25,700	130,900	17,000	113,900
1968/69 ...	283,600	110,800	172,800	11,200	26,100	135,500	18,900	116,600
1969/70 ...	286,800	108,900	177,900	11,200	26,500	140,200	20,800	119,400
1970/71 ...	289,500	106,700	182,800	11,200	26,900	144,700	22,700	122,000
1971/72 ...	292,300	104,600	187,700	11,200	27,300	149,200	24,600	124,600
1972/73 ...	294,400	101,800	192,600	11,200	27,700	153,700	26,500	127,200
1973/74 ...	296,400	98,900	197,500	11,200	28,100	158,200	28,300	129,900
1974/75 ...	298,400	95,900	202,500	11,200	28,500	162,800	30,200	132,600
1975/76 ...	300,400	93,000	207,400	11,200	28,900	167,300	32,100	135,200
1976/77 ...	302,100	89,800	212,300	11,200	29,300	171,800	34,000	137,800
1977/78 ...	303,700	86,500	217,200	11,200	29,700	176,300	35,900	140,400
1978/79 ...	305,500	83,400	222,100	11,200	30,100	180,800	37,700	143,100
1979/80 ...	306,900	79,900	227,000	11,200	30,500	185,300	39,600	145,700
1980/81 ...	308,500	76,300	232,200	11,200	30,900	190,100	41,500	148,600
1981/82 ...	309,600	72,700	236,900	11,200	31,300	194,400	43,400	151,000
1982/83 ...	311,000	69,100	241,900	11,200	31,700	199,000	45,300	153,700
1983/84 ...	312,300	65,500	246,800	11,200	32,100	203,500	47,200	156,300
1984/85 ...	313,200	60,900	252,300	11,200	32,500	208,600	49,000	159,600
1985/86 ...	314,100	56,600	257,500	11,200	32,900	213,400	50,900	162,500
1986/87 ...	315,400	52,600	262,800	11,200	33,300	218,300	52,800	165,500
1987/88 ...	317,600	49,400	268,200	11,200	33,700	223,300	54,700	168,600
1988/89 ...	320,100	46,200	273,900	11,200	34,100	228,600	56,600	172,000
1989/90 ...	322,900	43,800	279,100	11,200	34,500	233,400	58,500	174,900
1990/91 ...	326,700	42,400	284,300	11,200	34,900	238,200	60,300	177,900
1991/92 ...	330,900	40,900	290,000	11,200	35,300	243,500	62,200	181,300

① Includes Palo Alto (6,500 acre-feet).

water supplies will still be insufficient to meet all of the anticipated demand in 1970. The only way that the full demand can be met and the depletion of the basin restored will be through the construction of, first, the South Bay Aqueduct and, secondly, the Pacheco Pass facilities as soon as possible to bring water into the south end of the basin for groundwater replenishment and direct use.

Projections of County Assessed Value

Table 6 presents a projection of county assessed valuation for land and improvements, the tax base for the Santa Clara County Flood Control and Water Conservation District water importation tax, for the 30-year period 1962/63 through 1991/92. In this projection it has been assumed that assessed valuation will increase at a declining rate, starting at 8 per cent in the years 1962/63 through 1965/66, 7 per cent in the years 1966/67 through 1970/71, 6 per cent in the years 1971/72 through 1975/76, 5 per cent in the years 1976/77 through 1980/81, and 3 per cent per year thereafter. In view of the county's historical growth rate in the last decade, which has averaged over 13 per cent per year—as shown in Table 3, the projection presented in the table is believed to be conservative.

TABLE 6

SANTA CLARA COUNTY

Projection of Assessed Valuation of Land and Improvements

Fiscal Year	Estimated County Assessed Valuation (Land & Improvements)	Fiscal Year	Estimated County Assessed Valuation (Land & Improvements)
1962/63	$1,366,000,000	1977/78	$3,558,000,000
1963/64	1,475,000,000	1978/79	3,736,000,000
1964/65	1,593,000,000	1979/80	3,923,000,000
1965/66	1,720,000,000	1980/81	4,119,000,000
1966/67	1,840,000,000	1981/82	4,284,000,000
1967/68	1,969,000,000	1982/83	4,455,000,000
1968/69	2,107,000,000	1983/84	4,633,000,000
1969/70	2,254,000,000	1984/85	4,818,000,000
1970/71	2,412,000,000	1985/86	5,011,000,000
1971/72	2,557,000,000	1986/87	5,161,000,000
1972/73	2,710,000,000	1987/88	5,316,000,000
1973/74	2,873,000,000	1988/89	5,475,000,000
1974/75	3,045,000,000	1989/90	5,639,000,000
1975/76	3,228,000,000	1990/91	5,808,000,000
1976/77	3,389,000,000	1991/92	5,982,000,000

BASIC CONCEPT OF WATER SUPPLY

Present Sources of Supply

Present sources of supply can be divided into three general classifications: (a) groundwater, (b) surface water, and (c) imported water from Hetch Hetchy.

Groundwater Supplies. By far the major portion of present water supply is obtained from the underground basin in the North Santa Clara Valley. This basin, comparable to a large underground reservoir, has a capacity of approximately two million acre-feet of water. Wells which penetrate the basin withdraw water for agricultural and municipal and industrial uses. This water is replaced by percolating waters from rainfall or by recharge through manmade facilities.

The underground basin contains aquifers—gravels and sand layers—which can be recharged through percolation. Because of the weight of overlying soils, however, extensive removal of water results in compaction of the soil with a corresponding reduction in the size of the reservoir space and which can never be recovered regardless of the amount of water available for percolation.

The character of the underground basin is not uniform throughout the North Santa Clara Valley. The foothill regions on the east and west do not overlie the central portion of the basin and contain soils with only limited transmissibility. The areas which require supplemental water, comprising the foothill regions on the east, lie between Milpitas and Evergreen and on the west from Los Gatos, Monte Sereno, Saratoga to Monte Vista, Los Altos, Los Altos Hills, parts of Mountain View, Sunnyvale, and Palo Alto. The subsurface geological conditions in these areas limit the availability of groundwater.

Surface Supply. Local surface water supply from existing in-county sources is relatively limited. Two major agencies have contributed, however, to the sources of such supplies. These are the Santa Clara Valley Water Conservation District and the San Jose Water Works. The San Jose Water Works, through construction of Austrian Dam to create Lake Elsman and other surface diversion structures, primarily on Los Gatos Creek and Saratoga Creek, is able to supply approximately 20 per cent of its present demand from surface sources. This amounts to approximately 11,200 acre-feet per year.

The surface facilities of the Santa Clara Valley Water Conservation District are used primarily for storage of water for recharge of the groundwater basin. These facilities are not used to any great extent for direct delivery of water to municipal users.

Imported Water from Hetch Hetchy. The only source at present of imported water in the county is the lower loop of the Hetch Hetchy Aqueduct. This facility, installed in 1952, now provides a portion of the water supplies for the communities of Milpitas, Sunnyvale, Mountain View, and Palo Alto. The Hetch Hetchy Aqueduct, a major engineering accomplishment, transmits water from the Tuolumne River in Yosemite to the San Francisco Peninsula and the City and County of San Francisco. The original aqueduct crosses San Francisco Bay near the Dumbarton Bridge and terminates in the Crystal Springs Reservoir. Water from this source will be able to supply much of the needs of the northernmost area of the North Santa Clara Valley.

The water delivered by the Hetch Hetchy system is notable in that it provides a water of exceptionally fine quality. Because of the high quality of the water, legal limitations, and its delivery cost, it is used entirely for municipal purposes in areas adjacent to the aqueduct. Hetch Hetchy water cannot be used for distribution by privately owned enterprises because of the legal limitations of the Raker Act, which authorizes use of Tuolumne River water by San Francisco. Hetch Hetchy, therefore, cannot provide a lasting solution to the overall agricultural, municipal, and industrial needs of the North Santa Clara Valley.

Present Distribution Agencies

There are 10 major suppliers of municipal and industrial water in Zone W-1. In 1961 they served a total of approximately 158,607 active service connections, exclusive of fire hydrants. In that year they produced approximately 100,983 acre-feet of water, supplied primarily from wells, springs, and purchases of Hetch Hetchy water. Table 7 shows the service areas of individual water agencies, the number of metered customers as of December 31, 1961, and the total water production during 1961. The water production figures shown in Table 7 do not include water production by mutual water companies, or water production by private commercial and industrial concerns which is included in the municipal and industrial water requirements.

TABLE 7

SANTA CLARA COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

Major Water Producers—Zone W-1

Name of Producer	Service Area	Number of Customers 12/31/61	Production (Acre-Feet) 1961
California Water Service Co.	Los Altos, Sunnyvale, Cupertino, Mountain View	11,902	8,604.5
Campbell Water Co.	Campbell, San Jose	3,378	1,993.8
City of Cupertino	Cupertino	1,370	1,118.0
Milpitas County Water District	Milpitas	2,164	1,694.0
City of Mountain View	Mountain View	7,307	4,864.2
North Los Altos Water Co.	Los Altos, Mountain View, Palo Alto	1,525	956.5①
City of San Jose	San Jose (Evergreen)	400	250.0②
San Jose Water Works	San Jose, Saratoga, Cupertino, Los Gatos, Monte Sereno	97,580	61,493.1
City of Santa Clara	Santa Clara	17,250	10,643.2
City of Sunnyvale	Sunnyvale	15,731	9,365.8
		158,607	100,983.1

① Based on recorded deliveries plus 5 per cent.
② Estimated—no production or delivery records available.

Santa Clara Valley Water Conservation District

The Santa Clara Valley Water Conservation District was formed in 1929 to provide a coordinated effort for conservation of water supplies in the North Santa Clara Valley area. The district, through a modest tax on land and the issuance of bonds, has been able to build the eight major reservoirs as shown on the following page.

SANTA CLARA VALLEY WATER CONSERVATION DISTRICT

Reservoirs

Name	Capacity (Acre-Feet)	Name	Capacity (Acre-Feet)
Almaden	1,960	Lexington	21,430
Anderson	91,300	Stevens Creek	3,860
Calero	9,210	Vasona	750
Coyote	24,510		
Guadalupe	3,460	TOTAL	156,480

The total overall capacity of these reservoirs totals more than 150,000 acre-feet. Runoff from surface streams collected in these reservoirs is fed to percolation ponds which are operated by the district on Los Gatos, Guadalupe, Calabazas, San Tomas Aquinas, Yorba Linda, Dry, Saratoga, Almaden, Coyote, and Penitencia Creeks. In its 30-year history the district has successfully conserved, through percolation, more than 1,200,000 acre-feet of water. Without the facilities of the Santa Clara Valley Water Conservation District, this water supply would have been wasted into San Francisco Bay and water levels would have been reduced far below their present levels.

The South Bay Aqueduct

The South Bay Aqueduct is an integral part of the Feather River Project to bring water from the Sacramento-San Joaquin River Delta to serve portions of Alameda, Contra Costa, and northern Santa Clara Counties. It is expected that the aqueduct, which is now under construction, will bring some 210,000 acre-feet of water annually into the South Bay area. Water service from the aqueduct has already begun in the Livermore Valley.

The aqueduct will consist of some 39 miles of canals, tunnels, and pipelines from the Delta to Airpoint Reservoir at Milpitas. The facilities will include the Del Valle Dam in the Livermore Valley.

The aqueduct will terminate at Airpoint Reservoir in northern Santa Clara Valley, east of Milpitas. Airpoint Dam will consist of a 170-foot high, earth-filled dam and will create a 3,500 acre-foot reservoir with a water surface area of 65 acres.

Pacheco Pass Aqueduct

The Pacheco Pass Aqueduct will take water from the San Luis Reservoir, near Los Banos, through a tunnel under Pacheco Pass, east of Gilroy. Water from this source will flow to the base of Anderson Reservoir where it can be distributed for percolation or for direct use for agricultural purposes and/or municipal and industrial uses. The San Luis Reservoir is planned as a joint Federal-State facility as part of the Central Valley Project of the U. S. Bureau of Reclamation and of the Feather River Project of the State of California.

It is anticipated that Pacheco Pass water will not be available until some time after 1970, and because of its location south of the center of the north valley area, that its best use will be as supplemental water for percolation in the area extending from Morgan Hill to Coyote at the Guadalupe and Almaden Creek areas and at Vasona on Los Gatos Creek. When such water becomes available it will be possible to replenish the depleted water supply of the groundwater basin and to supplement the South Bay Aqueduct municipal and industrial deliveries.

DESCRIPTION OF THE IN-COUNTY PROJECT

The proposed in-county project is concerned basically with the distribution within Santa Clara County of water to be imported from both the South Bay Aqueduct and the Pacheco Pass facility. The general plan of the proposed project is shown on Figure 1.

The most urgent requirement to solve the overall water problem is the construction of the in-county distribution facilities whose initial purpose will be to transport water supplies from Airpoint Reservoir, the terminus of the South Bay Aqueduct, to Los Gatos where it may be percolated in the Los Gatos Creek. Other facilities, part of the in-county distribution system, will connect Vasona Reservoir at Los Gatos with Anderson Reservoir, which will provide additional water for percolation in Guadalupe and Los Gatos Creeks. A branch line will be constructed to run north from Los Gatos, where treated water can be distributed on the surface. A similar line for treated water will run north and south to serve Milpitas and the Evergreen area.

The in-county distribution facilities, described in detail in the following section, will be completed within about a five-year period. Their initial use will be for the transportation of water for percolation and for initial supplies of treated water for distribution on the surface in the fringe areas of the valley. Upon completion of the Pacheco Pass Aqueduct, shortly after 1970, the facilities can be used for transportation of treated water from the South Bay Aqueduct source and for the transportation of water for percolation and direct surface use from the Pacheco Pass source. The facilities, therefore, have been designed to provide flexible operation for the existing recharge ponds of the Santa Clara Valley Water Conservation District, for water from the South Bay Aqueduct source, and for water from the Pacheco Pass source.

Transmission Lines

The pipeline plans for the distribution system have been prepared by the engineering firm of Creegan and D'Angelo. All pipelines are planned to be of a size having sufficient capacity to serve the water needs of the various areas to the year 2020. The following is a description of the proposed distribution system.

Line 1, the Northeast Pipeline, serves two purposes. It will receive raw water from the South Bay Aqueduct at Airpoint Reservoir and will deliver it to pipes that connect to the Penitencia Creek percolation ponds and the Eastside treatment plant. Connection Line A is actually two pipes, one of which runs northeasterly from the terminus of Line 1 in Piedmont Road to the Eastside treatment plant. A turnout to the Penitencia percolation ponds will be installed near the plant. The second pipe is a treated water return from the plant to Piedmont Road, where it will be cross-connected to Lines 4 and 5 and later to Line 2.

Line 2, the Central Pipeline, starts at the turnout to Connection Line A and runs in a general southwesterly direction through the cities of San Jose and Campbell to a dual turnout to Vasona Reservoir and to the Westside treatment plant.

Line 2A, called the Central Extension, extends from this turnout to Vasona Reservoir, and Connection Line B runs westerly from the turnout through a temporary pumping station to the Westside treatment plant. The pumping plant may be eliminated or modified during final design.

Lines 2, 2A, and Connection Line B will be used to deliver raw water to the Westside treatment plant, Vasona Reservoir, and the various percolation ponds of the Santa Clara Valley Water

Conservation District located in the Los Gatos Creek area. Turnouts from Lines 2 and 2A will serve Vasona Reservoir, the Los Gatos Creek percolation ponds, and Page Ditch, which in turn supplies the Hacienda and Page percolation ponds. A turnout from Connection Line B will serve the Vasona Canal, which in turn supplies water for direct irrigation as well as percolating water into San Tomas Aquinas Creek, Calabazas Creek, and Saratoga Creek stream beds.

Line 3, the Cross Valley Pipeline, will run from the terminus of Pacheco Pass Aqueduct at the base of Anderson Dam in a northwesterly direction to Calero Reservoir, thence to Vasona. When water is imported through the Pacheco Pass Aqueduct, Line 3 will deliver water to Calero Reservoir, Calero Creek, Alamitos Creek, the Alamitos percolation ponds, Guadalupe Creek, the Capitancillos percolation ponds, Kooser Road ponds, Ross Creek, Vasona Reservoir, and the complex of percolation facilities located in the Los Gatos Creek area.

When the supply of water from the South Bay Aqueduct is no longer sufficient to supply the water demands of the Westside treatment plant, the flow of water in Line 2A will be reversed. Water will be transported from Line 3 through Line 2A to the turnout for Connection Line B to the Westside treatment plant.

Lines 4 and 5, the Milpitas Pipeline and the East Pipeline, are treated-water lines which will deliver water from the Eastside treatment plant to the Milpitas and Evergreen areas, and ultimately San Jose, through Line 2—the Central Pipeline.

Line 7, the West Pipeline, will receive treated water from the Westside treatment plant for delivery to the areas of Mountain View and Palo Alto.

The use of Lines 1, 2, 2A and 3 for delivery of raw water to all the major percolation ponds and to the two treatment plants will provide a system capable of conjunctive operation of both surface-distributed water along with water for underground recharge.

Scheduling of Construction and Estimated Cost

The following schedule summarizes the cost of each pipeline, the estimated annual maintenance and operation cost of each line, and the estimated date of completion. It should be noted that there is a difference in cost estimates in the district engineer's report and this summary report of $1,815,000. This is attributable to the reduction in the estimated expenditures for Line 7. The district engineer's report provides for construction of Line 7 to Palo Alto; however, it is believed that Line 7 initially will only extend as far as Farndon Avenue. The remaining differences occur as a

SANTA CLARA COUNTY FLOOD CONTROL
AND WATER CONSERVATION DISTRICT

Estimated Pipeline Construction and Annual Maintenance and Operation Costs

Description	Estimated Total Cost	In Service	Estimated Annual M & O
Line 1—Connection A	$ 3,000,000	July 1964	$ 5,000
Line 2-2A	7,900,000	July 1964	13,000
Line 7—Connection B	5,460,000	January 1966	9,000
Line 3—Part 1	2,100,000	January 1966	6,000
Line 3—Part 2	9,500,000	January 1971	15,000
Lines 4 and 5	2,300,000	January 1968	3,500
Interest during Construction	475,000		
	$30,735,000		

result of adjustments to the allowance for additional contingencies subsequent to the submission of the district engineer's report wherein contingencies have been adjusted to an average rate of 24 per cent of estimated construction costs. The summary report has reflected these changes.

Treatment Plants

The Eastside treatment plant, to be located in the Penitencia Creek area, will take water from Connection Line A and, after treatment, water will be carried in the return portion of Connection Line A and then distributed north to the Milpitas area through Line 4 and south to the Evergreen area through Line 5, the East Pipeline.

The Westside treatment plant, to be located in the Rinconada-Vasona area, will receive water from Connection Line B and, after treatment, will deliver it to Line 7 which will carry treated water in a general northwesterly direction into the Mountain View and Palo Alto areas.

The estimated cost of the treatment plants for ultimate capacity is as follows:

Westside Plant	$6,517,000
Eastside Plant	2,983,000
TOTAL	$9,500,000

Construction of the treatment plants in stages is recommended by the engineer, as stated below. The timing of each construction stage is also shown below; however, actual timing of stages will be determined by the need for treated water.

Kennedy Engineers' report has made the following recommendations and conclusions relative to water treatment:

1. Anticipated imported water will require treatment for turbidity removal and disinfection prior to distribution as supplemental potable water supply.

2. Water imported by the South Bay Aqueduct and the Pacheco project will have essentially the same characteristics.

3. Two water treatment plants will best meet the needs of the supplemental water requirements of the county.

4. Treatment facilities of each plant would utilize the "rapid sand filtration process" and include:

(a) Pretreatment and chemical mixing units
(b) Flocculation and sedimentation tanks
(c) Rapid rate sand filters
(d) Disinfection and storage facilities
(e) Filter wash and sludge drying features

5. Both plants should be of similar design and constructed in increments of ten million gallons per day capacity, in accordance with the following schedule:

Eastside Plant	Capacity (M.G.D.)
1966	10
1972	20
After 1980	40

Westside Plant	Capacity (M.G.D.)
1964	10
1968	20
1975	30
After 1980	60

Bond Authorization

As stated in the district engineer's report, the amount of bonds to be authorized by the electorate of Zone W-1 totals $42,050,000. This figure includes allowances for construction of all of Line 7 and for additional contingencies. If conditions in the future warrant the extension of Line 7, additional authorized bonds can be sold at that time. Therefore, the bond authorization should total $42,050,000 as shown in Table 8 below.

TABLE 8

SANTA CLARA COUNTY FLOOD CONTROL
AND WATER CONSERVATION DISTRICT

Summary of Capital Costs—Water Importation Program

Line 1—Connection A	$ 3,000,000
Line 2—2A	7,900,000
Line 3—Part 1	2,100,000
Line 3—Part 2	9,500,000
Lines 4 and 5	2,300,000
Line 7—Connection B	5,460,000
Westside Treatment Plant	6,517,000
Eastside Treatment Plant	2,983,000
Pipeline Extensions, Additional Contingencies	1,815,000
Interest During Construction	475,000
TOTAL	$42,050,000

BENEFITS OF THE IN-COUNTY FACILITIES

The Board of Supervisors of the Flood Control and Water Conservation District has created Zone W-1 as the "zone of benefit" of the in-county facilities. All of the area encompassed by the zone will receive many benefits from the proposed project. This zone is made up of a number of subareas which have various identifiable, direct benefits from the proposed facilities. The purpose of this section is to discuss these subareas and their applicable benefits.

Area and County-Wide Benefits

It should be apparent that there cannot exist the "haves" and the "have nots" in Zone W-1 because of the economic interdependence of the entire North Santa Clara Valley. Some areas of the North Santa Clara Valley have historically had a water supply that was available for the asking; other areas have had continuing problems of water supply.

Water is now being pumped out of the center of the basin to supply areas of limited water supply. It must be recognized that there is a direct relationship in the overall balance of water supply between what one agency does in one part of the valley and what another agency does in another part. Water supply for the entire valley presents an integrated, general problem—capable of solution with benefits to all parts of the area.

The fact that even areas outside of the zone of direct benefit of the proposed facilities (Zone W-1) will receive some benefits from the importation of water has already been recognized by the County Board of Supervisors in levying a district-wide (county-wide) tax of 5 cents per $100 assessed valuation on land and improvements. Funds from this source will provide for the capital costs of the South Bay Aqueduct. Later, funds from this source will be used, in part, for financing the Pacheco Pass Aqueduct.

Direct Benefits

The general area within the zone of benefit will receive many forms of direct benefits, including: the availability of water supply, substitution of water supply on the surface to conserve underground supplies, percolation of water to replenish underground supplies, protection of the underground reservoir capacity, protection of water quality, restriction of saline intrusion, retardation of subsidence, reduction of pumping lift and power expenses, recreation and reduction in capital cost of well facilities.

The development of a comprehensive water program through construction of the in-county facilities has many direct benefits within the zone of benefit; these are as follows:

1. *General Economic Benefit—Availability of Water Supply.* Water is the most valuable natural resource in Santa Clara County. Its availability will determine the final limit of the economic growth of the area. The conservation, regulation, and delivery of this county's water resources are matters of direct and material concern to every resident. Without adequate water supply there could be no economic growth, continued prosperity, or increased employment. Sufficient water supplies are a basic consideration of industry, for the maintenance of a strong economy, for public health, and for more productive agriculture. The primary purpose of in-county facilities is to provide water in ample quantities throughout the North County area.

2. *Conservation of Underground Supply.* With the in-county facilities, some water will be delivered directly to the consumer—on the surface. This will reduce costs and will conserve the underground supplies. Since the underground acts as a reservoir, it can be used for periods of peak demand with a corresponding reduction in the cost of and need for surface storage facilities.

3. *Alternate Sources of Supply.* The water importation program with the in-county facilities will include the use of the underground basin, use of existing surface channels, distribution systems of existing agencies, and existing and proposed sources of importation. Through one or a combination of these methods, all areas within the zone of benefit will obtain water supply to meet its needs. The program as proposed, in fact, makes it possible for many areas to have directly available two or more alternate sources of supply (for example, from underground sources, from treated surface-delivered, imported water and/or from Hetch Hetchy), with a resulting increase in the safety and adequacy obtainable from multiple sources of water supplies.

4. *Reduction of Subsidence.* By a reduction of subsidence, the investment of the North Santa Clara Valley in sewerage and storm drainage facilities, flood control channels and levees, and other engineering facilities can be preserved and the area protected against flood damage from inundation during heavy rains and high water. Subsidence occurs by the fluctuation of artesian pressure which is, in fact, a measure of the availability of water supply. Subsidence can only be halted by the replenishment of water supplies to replace those withdrawn during past years.

5. *Protection of Underground Reservoir Capacity.* When water is withdrawn from the underground it is never possible to restore completely the volumetric capacity available for storage of underground water supplies. The withdrawal of water affects the consolidation (which appears on the surface, in part, as subsidence) and compaction of underground soils which cannot be reopened upon percolation of water supplies. It is essential that the underground reservoir capacity be maintained and that the soils be retained in an unconsolidated position wherever possible in order to permit maximum transmissibility and storage of underground water supplies.

6. *Maintenance of Water Quality.* Delivery of treated water on the surface through the in-county facilities, together with the percolation of water, will improve the overall quality of water available in Santa Clara County. Improvement of the water quality can act to reduce industrial and other costs for processing water and can reduce the costs of water softening and other household and commercial equipment necessary to provide a water supply of high quality.

7. *Prevention of Saline Intrusion.* Percolation of water supplies at a rate equal to or greater than the rate at which water is withdrawn can act to reduce the danger of salt water intrusion into the basin by maintaining adequate underground water pressures which will hold out salt water from the bay. Saline intrusion, once established, can be difficult to remove and must be curtailed at the outset wherever possible. The only practical solution is to percolate water into the underground basin and maintain an adequate reserve in those areas which are subject to possible infiltration of saline water.

8. *Reduction of Pumping Costs.* By percolation and replenishment of the underground water supplies, the groundwater level will be raised with a resulting reduction in pumping costs.

9. *Stabilization of Water Levels.* A major benefit of the proposed in-county facilities will be the elimination of major fluctuations in pumping levels which require extensive modifications of pumping equipment. This includes the cost of lowering pumps and deepening wells as groundwaters recede, together with the installation of additional impellers and enlargement of pump motors to provide continuing water deliveries. By percolation of imported water to supplement that which is already available, the groundwater level can be stabilized with a direct benefit to underground pumpers.

10. *Pricing of Imported Supplies.* Operation of the in-county facilities by the Flood Control and Water Conservation District with the availability of State water through the South Bay Aqueduct should have direct benefits to all water users because of influence on the pricing positions of

the San Francisco Water Department and the Federal Government. The in-county facilities will provide three alternative imported supplies for the North Santa Clara Valley area. The availability of these alternate sources of supply will certainly result in the ability of the county to obtain imported water at the lowest possible overall cost.

Areas of Benefit

The zone of benefit covers two major types of area. These are the (a) northern portions of the Santa Clara Valley Water Conservation District which overlie the underground basin and (b) fringe areas, principally in the Milpitas and Evergreen areas in the east and in the Saratoga-Los Gatos areas on the west, which lie in the foothills outside the Santa Clara Valley Water Conservation District, but whose water supply is obtained principally from underground sources within the district and pumped to these areas of higher elevation where local water supplies are limited.

The areas within the zone that are also within the Water Conservation District boundaries can, of course, be divided into areas based upon the availability of underground water supplies. Areas in the center of the valley have supplies available, while areas on the outer fringes may have varying quantities of water available depending greatly upon current climatic conditions and upon transmissibility of underground aquifers. Areas like North Los Altos have only limited capacity for recharge and withdrawal of water supply from the underground.

Another subarea of the zone of benefit is the Hetch Hetchy service area, which will benefit from the program by the substitution of water supply from one area of the valley to another. This was recognized by the Santa Clara Valley Water Conservation District which, in 1961, inaugurated a program of water substitution utilizing the Hetch Hetchy facilities. Under its program, it was indicated that an agency taking water from the Hetch Hetchy supply was, in fact, reducing the demand on the underground by an equal amount, leaving underground water supplies of the district available for other consumers. The district inaugurated a payment of $20 per acre-foot to aid in the purchase of Hetch Hetchy water and to encourage the use of surface water supplies from Hetch Hetchy during a period when no other supplementary imported water supply was available.

One of the other potential benefits of the in-county facilities to Hetchy Hetchy area customers lies in the competitive positions which the in-county facilities will have on the cost of water. While these customers may continue to take water from Hetch Hetchy, either on a partial or exclusive basis, the fact that an alternate source of surface-delivered, treated water supply will be available should act to the benefit of all potential Hetch Hetchy area consumers insofar as the price of water supply is concerned.

All of the subareas within the zone of benefit will receive many direct benefits as outlined above. The present Hetch Hetchy users and others may in some instances not receive water directly from the proposed facilities. They will be offered, however, an increased supply of underground water with a number of important, direct benefits. Those cities taking Hetch Hetchy water supply will receive direct benefit from restoration of the groundwater basin by reduction of subsidence, and elimination of the threat of salt water intrusion, the provision of an alternate underground supply with savings in pumping costs and equipment costs where applicable, and will certainly receive direct benefits in the pricing structure of Hetch Hetchy water, and through the reimbursement program for water substitution of the Santa Clara Valley Water Conservation District.

THE DISTRICT

Formation and General Purposes

The Santa Clara County Flood Control and Water Conservation District was created as a special district (Water Code, Section 7335) by the Legislature of the State of California in July 1951. The district is county-wide. The objects and purposes of the district are to provide:

1. *Control of Flood and Storm Waters.* The district has the power to provide for the control of the flood and storm waters that originate within the district and the flood and storm water of streams whose sources are outside of the district but flow into the district and the watercourses and watersheds of streams flowing into the district.

2. *Protection of Property.* It is the purpose of the district to protect highways, life, and property within the district from flood or storm waters originating within or without the district.

3. *Conservation of Water.* The district may provide for the conservation of flood and storm waters, for beneficial and useful purposes by retaining, storing, spreading, and percolating these waters into the underground and, in addition, the prevention of waste or diminution of the district water supplies.

4. *Additional Water for Beneficial Use.* The district may obtain water from any source from within or without the district for beneficial use within the district.

The district has the power to store water in surface or underground reservoirs for the common benefit of the district or of any zone or zones within the district, and it may do any and every lawful act necessary that sufficient water may be available for any present or future beneficial use.

Powers

The powers of the district are broad and include perpetual succession, the right to sue and be sued, the right of eminent domain, the right to acquire or construct, or acquire, hold, and use real and personal property of every kind necessary to carry out the objects or purposes of the act.

Governing Board

The district has the Board of Supervisors of Santa Clara County as its governing board. The officers of the County of Santa Clara are all ex officio officers of the district. These include the district attorney, county counsel, county surveyor, county assessor, county tax collector, county auditor, and the county treasurer.

Zones

When a project is to be undertaken by the district, the governing board must determine whether the project is for the common benefit of the district as a whole or for the common benefit of a single area or two or more areas. In the event that the project will benefit a single area, the district must create a zone of benefit to include those lands which will benefit by the district's projects. The zone is created by a resolution of the governing board, notice of formation, and a hearing before the governing board. The board has formed Zone W-1 as the initial zone of benefit for proposed in-county water importation facilities.

Taxes and Assessments

The governing board has the power in any year to levy ad valorem taxes or assessments in the district to carry out the objectives and purposes of the act of common benefit to the district. The district also has the power to levy taxes or assessments in any zone to pay the cost of carrying out the purposes on behalf of the respective zone or zones. The taxes or assessments may be levied upon all property within the district or zone or upon all real property within the district or a zone. Taxes or assessments levied by the district are collected together with taxes for other county purposes.

Bonds

Whenever the governing board determines that a bonded indebtedness should be incurred to pay the cost of any project for any zone or zones, the board—by resolution—determines and declares the respective amount of bonds to be issued, the maximum rate of interest to be paid on the indebtedness, the form of the bonds, and the terms and conditions of sale.

A special bond election called by ordinance must be submitted to the qualified electors of the zone or participating zones which states the objectives and purposes for which the indebtedness is to be incurred. If at such an election two-thirds of the votes cast are in favor of incurring such indebtedness, then bonds may be issued.

The board may divide the principal amount of any issue into series. The final maturity date of any bond issue or series must not exceed 40 years from the time of issuance. The board may also provide for the redemption of all or any part of any issue or series of bonds before maturity.

Groundwater Charges

At the special 1962 legislative session, the Santa Clara County Flood Control and Water Conservation District Act was amended to give the district the power to levy and collect a groundwater charge for the production of water from the groundwater supplies within a zone or zones of the district which will benefit from the recharge of underground water supplies or the distribution of imported water in such zone or zones. The groundwater charges are levied upon all water-producing facilities, whether public or private, for the benefit of all who rely directly or indirectly upon the groundwater supplies or water imported into such zone or zones.

The proceeds of the groundwater charges are to be used exclusively for the following purposes: (a) to pay the cost of constructing, maintaining, and operating facilities which will import water into the district which will benefit such zone or zones, (b) to pay the costs of imported water, (c) to pay the cost of constructing, maintaining, and operating facilities which will conserve or distribute water within such zone or zones, and (d) to pay the principal or interest or any bonded indebtedness or other obligation incurred by the district on behalf of such zone or zones.

The groundwater charge is in addition to any general tax or assessment levied within the district or any zone or zones thereof. The groundwater charge in any year shall not exceed $5 per acre-foot for agricultural water or $10 per acre-foot for all water other than agricultural water.

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THE FINANCING PLAN

General Obligation Bond Financing

All of the capital costs of the in-county water distribution system and water treatment facilities are to be financed by revenue supported general obligation bonds secured by a zone of the Santa Clara County Flood Control and Water Conservation District. This area has been designated as Zone W-1 and encompasses substantially all of the area of the North Santa Clara Valley. Revenue supported general obligation bonds represent the least expensive means by which the zone can borrow the amounts of money needed to construct the proposed water project.

The use of revenue bonds was not recommended for the following reasons: (1) no history of revenue, (2) greater interest cost, (3) lack of flexibility. Other financing media such as assessment financing is equally not suited.

Principal Amount. A principal amount of $42,050,000 is believed necessary in order to provide sufficient funds for construction, allowances for estimated inflation, interest during construction, and to repay funds advanced to Zone W-1 by the Santa Clara County Flood Control and Water Conservation District. The estimated cost of the project is summarized in Table 8. A total bond authorization of this amount is recommended in order to provide necessary funds for the project.

Revenue-Supported Bonds. General obligation bonds are secured by the full faith and credit of the zone of issuance and, to the extent that revenues are not available from operations or other sources, the district must levy taxes for their payment on all real property within the zone. The financial plan for the proposed in-county facilities, however, does not contemplate the use of taxation for the payment of principal and interest on the bonds. Groundwater charges of $5 and $10 per acre-foot for agricultural and municipal and industrial water use, respectively, are expected to provide more than sufficient revenues for the payment of the in-county transportation facilities and the Delta water charge. The capital cost of the water treatment facilities will also be paid from the sale of treated water at an initial estimated price of $40 per acre-foot, as discussed in the following section of this report.

Bond Series. Bonds should be sold in series to coincide with the construction schedule in order to avoid the payment of unnecessary interest. A total of five bond sales is suggested beginning in July 1963 and extending through January 1, 1970. The district's enabling act does not set a statutory limit for the amount of debt the district or any zone thereof may incur. However, the total amount of bonds which is to be sold is well within marketable limits and will probably total less than 3 per cent of Zone W-1's estimated assessed valuation when all the bonds have been issued (1970).

This ratio is a strong factor in determining the interest rate which will be paid by the zone. Interest for general obligation bonds in the preparation of the financial plan has been estimated at an overall rate of 4 per cent per annum and is believed to be conservative in the light of the present bond market, the credit standing of Zone W-1, the ratio of debt to assessed valuation, and the expected revenue support for the bonds from the groundwater charge and sales of treated water.

Major Bond Features

The salient features of the proposed general obligation bonds are discussed below. Within limits of adopted policy, bond sales and scheduled maturities can be adjusted to the extent required by the construction schedule and conditions in the bond market.

1. Bonds are sold in series as funds are needed for the construction program. Sales are not held more often than once every six months.

2. Principal payments are to begin within two years after each series of bonds have been issued and will continue until all of the bonds have been paid, which will occur in the year 2009. Many of the bonds can be made callable so that the district can retire them before maturity, if desired, or can refund them if better interest rates are available in the future. This latter provision is now possible as the district's act has been amended to permit bonds to be called.

3. A total of $475,000 has been capitalized for interest during construction for the bonds to be sold in July 1963. The capitalized interest represents interest for one year, and there is a possibility that it will only be necessary to actually pay interest from bond proceeds for a six-month period.

4. Principal matures for each bond series within two years from the date the bonds are issued. The financial plan provides for gradually increasing bond service requirements (principal and interest) beginning in the second year, increasing to an approximately equal annual amount by the sixth year and continuing equally thereafter until all of the bonds have been paid. In establishing this gradually increasing schedule of debt service payments it was determined that the bond service requirements should increase gradually, with a conservative projection of district revenues in the formative stages of the project.

Maturity Schedule

Table 9 presents an illustrative 40-year bond maturity schedule for a $10,000,000 principal amount, with interest computed at 4 per cent per annum. The schedule provides for the payment of interest only for the first year, with gradually increasing bond service (principal plus interest) for the next four years and then approximately equal annual bond service until final maturity.

Annual Capital and Operation Expenses

It is possible to calculate estimated annual bond service for each of the in-county lines by multiplying the figure shown in the total bond service column by the estimated cost of the facility. For example, if the bond service figure of $400,000 in year 1 were to be multiplied by the factor .3000 ($3,000,000), the estimated cost of Line 1, the result would be $120,000, the estimated first year bond service for Line 1 capital costs. By multiplying the bond service column by the appropriate factor for each facility and then adding the estimated annual maintenance and operation costs to the product, the annual total cost for each facility can be achieved. These costs have been referred to in the district's report as transportation costs and are included in Table 10.

Table 10 presents a summary of the annual capital costs and maintenance and operating costs for each of the in-county facilities. The table assumes that bonds for lines 1, 2, and 2A will be sold in July 1963 and that bonds for lines 7; 3-1; 4 and 5; and 3-2 will be sold in January of 1965, 1966, 1967 and 1970 respectively, to provide construction funds in accordance with the proposed construction schedule. Maintenance and operating cost estimates have been supplied by the district and are assumed to start one year after bonds have been sold. It is anticipated that interest for one year will be paid from bond proceeds for the capital costs of line 1, 2, and 2A; however, it may prove possible to reduce the amount of interest to be paid from bond proceeds to six months' interest.

Bond service, together with the estimated maintenance and operating cost for each facility are shown separately. The total annual cost for the in-county facilities will range from $453,400 initially to an average of $1,647,700 per year from 1975/76 until the first series of bonds have been retired in 2002/03.

TABLE 9

Illustrative Bond Maturity Schedule

$10,000,000 Principal Amount—Forty-Year Term

Year	Bonds Outstanding	Interest at 4%	Principal Maturing	Total Bond Service
1	$10,000,000	$400,000	$	$400,000
2	10,000,000	400,000	30,000	430,000
3	9,970,000	398,800	60,000	458,800
4	9,910,000	396,400	90,000	486,400
5	9,820,000	392,800	120,000	512,800
6	9,700,000	388,000	130,000	518,000
7	9,570,000	382,800	130,000	512,800
8	9,440,000	377,600	140,000	517,600
9	9,300,000	372,000	150,000	522,000
10	9,150,000	366,000	160,000	526,000
11	8,990,000	359,600	160,000	519,600
12	8,830,000	353,200	170,000	523,200
13	8,660,000	346,400	170,000	516,400
14	8,490,000	339,600	180,000	519,600
15	8,310,000	332,400	190,000	522,400
16	8,120,000	324,800	200,000	524,800
17	7,920,000	316,800	200,000	516,800
18	7,720,000	308,800	210,000	518,800
19	7,510,000	300,400	220,000	520,400
20	7,290,000	291,600	230,000	521,600
21	7,060,000	282,400	240,000	522,400
22	6,820,000	272,800	250,000	522,800
23	6,570,000	262,800	260,000	522,800
24	6,310,000	252,400	270,000	522,400
25	6,040,000	241,600	280,000	521,600
26	5,760,000	230,400	290,000	520,400
27	5,470,000	218,800	300,000	518,800
28	5,170,000	206,800	310,000	516,800
29	4,860,000	194,400	320,000	514,400
30	4,540,000	181,600	340,000	521,600
31	4,200,000	168,000	350,000	518,000
32	3,850,000	154,000	360,000	514,000
33	3,490,000	139,600	380,000	519,600
34	3,110,000	124,400	400,000	524,400
35	2,710,000	108,400	410,000	518,400
36	2,300,000	92,000	420,000	512,000
37	1,880,000	75,200	440,000	515,200
38	1,440,000	57,600	460,000	517,600
39	980,000	39,200	480,000	519,200
40	500,000	20,000	500,000	520,000

Note: Use average of $520,000 for 6-40th years.

TABLE 10

SANTA CLARA COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

In-County Facilities—Estimated Annual Capital and Operating Costs

	Line 1	Line 2-2A	Interest During Construction①	Line 7	Line 3-1	Lines 4 & 5	Line 3-2	Total Transportation Costs
Principal Amount	$3,000,000	$7,900,000		$5,460,000	$2,100,000	$2,300,000	$9,500,000	
Annual M&O	$5,000	$13,000		$9,000	$6,000	$3,500	$15,000	
1963/64	$120,000	$316,000	$17,400②					$ 453,400
1964/65	134,000	352,700	18,700	$109,200				614,600
1965/66	142,700	375,600	20,000	235,600	$ 42,000			815,900
1966/67	150,800	396,900	21,200	251,700	93,200	$ 46,000		959,800
1967/68	158,900	418,300	22,400	267,000	99,400	99,000		1,065,000
1968/69	161,000	423,800	22,700	281,800	105,300	105,800		1,100,400
1969/70	161,000	423,800	22,700	291,000	110,900	112,200	$190,000	1,311,600
1970/71	161,000	423,800	22,700	292,900	114,500	118,400	409,300	1,542,600
1971/72	161,000	423,800	22,700	292,900	115,200	122,300	437,300	1,575,200
1972/73	161,000	423,800	22,700	292,900	115,200	123,100	463,900	1,602,600
1973/74	161,000	423,800	22,700	292,900	115,200	123,100	489,600	1,628,300
1974/75	161,000	423,800	22,700	292,900	115,200	123,100	505,700	1,644,400
1975/76	161,000	423,800	22,700	292,900	115,200	123,100	509,000	1,647,700
1976/77	161,000	423,800	22,700	292,900	115,200	123,100	509,000	1,647,700
1977/78	161,000	423,800	22,700	292,900	115,200	123,100	509,000	1,647,700

① Bond service costs on $436,000 in bonds issued for interest during construction on lines 1 and 2-2A.

② To be paid from accumulated reserve.

Sources of Revenue

The Santa Clara County Water Commission recommended to the Board of Supervisors that the tax rate of 5 cents per $100 assessed valuation which has been levied on a county-wide basis by the district be continued for the purpose of paying for the general economic benefits which the county as a whole will receive from the South Bay and Pacheco Pass Aqueducts. The moneys derived from this tax will be used to pay the capital costs, including interest, of the aqueduct facilities. During 1961/62 the county general tax rate included 5 cents for this purpose. Beginning in 1962/63 this tax appears as a separate item, Santa Clara County Water Importation, and will apply only to land and improvements.

An indication of the amount of funds expected to be received from this source is presented below in Table 11. A 2 per cent factor has been used to allow for delinquencies. This factor is in keeping with the conservative approach to assessed valuation as actual delinquencies in county tax collections over the past ten years have averaged less than 1.25 per cent.

The estimated total annual revenues to be derived from groundwater charges of $5 per acre-foot and $10 per acre-foot for agricultural and municipal and industrial users, respectively, are also presented in Table 11.

No projections of income have been made for surface treated water as the price for treated water has not been firmly established; however, it is the recommendation of the Water Commission that treated water be priced so as to recover all capital costs of the treatment facilities, their operation and maintenance costs, water costs including transportation, and general overhead. Initial studies indicate that the price of $40 per acre-foot for treated water will meet these costs, but, if it should prove to be insufficient, the price for treated water must be adjusted accordingly.

TABLE 11

SANTA CLARA COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

Summary of Projected Annual Revenues from Groundwater Charges and Taxes

Fiscal Year	Agricultural Use		Municipal and Industrial Use		Total Groundwater Charge Revenues	Tax Revenues 5¢/$100 Land and Improvements	Total Tax and Groundwater Revenue
	Acre-Feet	Revenues $5/AF	Acre-Feet	Revenues $10/AF			
1962/63	120,200		107,700			$ 669,500	$ 669,500
1963/64	118,900	$594,500	112,300	$1,123,000	$1,717,500	723,000	2,440,500
1964/65	117,400	587,000	117,000	1,170,000	1,757,000	780,500	2,537,500
1965/66	115,900	579,500	121,600	1,216,000	1,795,500	843,000	2,638,500
1966/67	114,300	571,500	126,300	1,263,000	1,834,500	901,500	2,736,000
1967/68	112,500	562,500	130,900	1,309,000	1,871,500	965,000	2,836,500
1968/69	110,800	554,000	135,500	1,355,000	1,909,000	1,032,500	2,941,500
1969/70	108,900	544,500	140,200	1,402,000	1,946,500	1,104,500	3,051,000
1970/71	106,700	533,500	144,700	1,447,000	1,980,500	1,182,000	3,162,500
1971/72	104,600	523,000	149,200	1,492,000	2,015,000	1,253,000	3,268,000
1972/73	101,800	509,000	153,700	1,537,000	2,046,000	1,328,000	3,374,000
1973/74	98,900	494,500	158,200	1,582,000	2,076,500	1,408,000	3,484,500
1974/75	95,900	479,500	162,800	1,628,000	2,107,500	1,492,000	3,599,500
1975/76	93,000	465,000	167,300	1,673,000	2,138,000	1,581,500	3,719,500
1976/77	89,800	449,000	171,800	1,718,000	2,167,000	1,660,500	3,827,500
1977/78	86,500	432,500	176,300	1,763,000	2,195,500	1,743,500	3,939,000
1978/79	83,400	417,000	180,800	1,808,000	2,225,000	1,830,500	4,055,500
1979/80	79,900	399,500	185,300	1,853,000	2,252,500	1,922,500	4,175,000
1980/81	76,300	381,500	190,100	1,901,000	2,282,500	2,018,500	4,301,000
1981/82	72,700	363,500	194,400	1,944,000	2,307,500	2,099,000	4,406,500
1982/83	69,100	345,500	199,000	1,990,000	2,335,500	2,183,000	4,518,500
1983/84	65,500	327,500	203,500	2,035,000	2,362,500	2,270,000	4,632,500
1984/85	60,900	304,500	208,600	2,086,000	2,390,500	2,361,000	4,751,500
1985/86	56,600	283,000	213,400	2,134,000	2,417,000	2,455,500	4,872,500
1986/87	52,600	263,000	218,300	2,183,000	2,446,000	2,529,000	4,975,000
1987/88	49,400	247,000	223,300	2,233,000	2,480,000	2,605,000	5,085,000
1988/89	46,200	231,000	228,600	2,286,000	2,517,000	2,683,000	5,200,000
1989/90	43,800	219,000	233,400	2,334,000	2,553,000	2,763,000	5,316,000
1990/91	42,400	212,000	238,200	2,382,000	2,594,000	2,846,000	5,440,000
1991/92	40,900	204,500	243,500	2,435,000	2,639,500	2,931,000	5,570,500

Summary of Total Revenues and Expenses

Table 12 combines all of the estimated costs of the district's raw water importation project. Included are the capital costs of the South Bay Aqueduct and Pacheco Pass facility, water purchases from the State and Bureau of Reclamation as estimated by the Flood Control and Water Conservation District, and the estimated capital costs and maintenance and operating costs of the in-county transportation facilities. The total estimated revenues from taxes and groundwater charges, as shown in Table 11, are also presented. It is noted from this tabulation that estimated annual costs will exceed the estimated annual revenues in the period 1966/67 through 1978/79. This was expected and reserves which are to be accumulated in the initial years of the project are expected to offset these deficits. As additional safety, several factors should be recognized. First, the revenues produced from the 5 cent ad valorem tax contain a greater delinquency factor than actual

experience; second, the projected assessed valuation has been estimated at a conservative rate; third, no allowance has been made for the investment of reserve funds which, if invested at a nominal interest rate of 2.5 per cent per annum, would provide an estimated additional $800,000 through 1978/79, and, finally, no allowance has been made for the recreational benefits which will accrue to the district from the Pacheco Pass project which are expected to be reflected in lower costs for Pacheco Pass water.

TABLE 12

SANTA CLARA COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

Summary of Total Revenues and Expenses

Fiscal Year	Total South Bay Aqueduct Costs	Total Pacheco Costs	In-County Transportation Costs①	Total Costs	Total Revenues②	Annual Revenues Over Expenses	Accumulated Reserve
Beginning Balance							$ 620,000
1962/63	$ 306,800			$ 306,800	$ 669,500	$ 362,700	982,700
1963/64	633,900		$ 453,400③	1,087,300	2,440,500	1,789,200	2,771,900
1964/65	1,247,500		614,600	1,862,100	2,537,500	675,400	3,447,300
1965/66	1,674,900		815,900	2,490,800	2,638,500	147,700	3,595,000
1966/67	1,816,800		959,800	2,776,600	2,736,000	— 40,600	3,554,400
1967/68	1,817,600		1,065,000	2,882,600	2,836,500	— 46,100	3,508,300
1968/69	1,996,600		1,100,400	3,097,000	2,941,500	—155,500	3,352,800
1969/70	2,106,300		1,311,600	3,417,900	3,051,000	—366,900	2,985,900
1970/71	2,106,300	$ 38,500	1,542,600	3,687,400	3,162,500	—524,900	2,461,000
1971/72	2,106,300	83,700	1,575,200	3,765,200	3,268,000	—497,200	1,963,800
1972/73	2,106,800	120,500	1,602,600	3,829,900	3,374,000	—455,900	1,507,900
1973/74	2,108,200	154,800	1,628,300	3,891,300	3,484,500	—406,800	1,101,100
1974/75	2,112,800	190,800	1,644,400	3,948,000	3,599,500	—348,500	752,600
1975/76	2,115,100	225,900	1,647,700	3,988,700	3,719,500	—269,200	483,400
1976/77	2,118,300	260,100	1,647,700	4,026,100	3,827,500	—198,600	284,800
1977/78	2,121,500	290,200	1,647,700	4,059,400	3,939,000	—120,400	164,400
1978/79	2,126,600	326,900	1,647,700	4,101,200	4,055,500	— 45,700	118,700
1979/80	2,133,100	353,600	1,647,700	4,134,400	4,175,000	40,600	159,300
1980/81	2,134,200	387,800	1,647,700	4,169,700	4,301,000	131,300	290,600
1981/82	2,267,000	410,300	1,647,700	4,325,000	4,406,500	81,500	372,100
1982/83	2,270,900	442,000	1,647,700	4,360,600	4,518,500	157,900	530,000
1983/84	2,271,100	469,500	1,647,700	4,388,300	4,632,500	244,200	774,200
1984/85	2,271,200	492,800	1,647,700	4,411,700	4,751,500	339,800	1,114,000
1985/86	2,271,200	517,800	1,647,700	4,436,700	4,872,500	435,800	1,549,800
1986/87	2,271,400	549,400	1,647,700	4,468,500	4,975,000	506,500	2,056,300
1987/88	2,271,400	597,800	1,647,700	4,516,900	5,085,000	568,100	2,624,400
1988/89	2,274,000	658,600	1,647,700	4,580,300	5,200,000	619,700	3,244,100
1989/90	2,274,400	698,600	1,647,700	4,620,700	5,316,000	695,300	3,939,400
1990/91	2,274,500	807,900	1,647,700	4,730,100	5,440,000	709,900	4,649,300
1991/92	2,274,500	902,100	1,647,700	4,824,300	5,570,500	746,200	5,395,500

① From Table 10. ② From Table 11. ③ $436,000 to be paid from bond proceeds.

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